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RESULTS OF THE [ ] FIELD TEST  
OF 12 AND 14 JULY 1955

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1. The first phase of the [ ] Field Test was conducted between [ ] and St. Louis, Missouri, on 12 July. The second phase of this test was conducted between [ ] and Denver, Colorado, on 14 July. 50X1  
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2. Although liaison was maintained on the auxiliary radio circuit (a 16-F transmitter at the base station and an RS-6A unit in the field), propagation was very poor during the morning portion of the test from St. Louis. A number of dot transmissions were made from the RS-13 during the morning but with very poor results. In the afternoon the RS-13 frequency was changed to a 12 MC frequency which gave excellent results. The second day of testing, from Denver, was a complete loss due to poor propagation. Liaison on the auxiliary radio circuit could not be maintained and only fragments of a few dot transmissions were received at the base station. The field team reported that station WWV could not be heard on several of its frequencies and the ones that could be heard were intermittent due to fading. Thus no test results were obtained from Denver.
3. The primary purpose of the field test was to test the performance of the RS-13 Base Station System, specifically the RBR-13 Receiver. The secondary purpose was to give a final performance test to the newly designed keyer unit of the RS-13.

In the testing of the RS-13 Base Station System, comparisons were made between the various types of systems that may be incorporated. These systems were:

- A. Feeding the audio output of a receiver directly into an RAPC undulator.
  - B. Feeding the audio output of a receiver into a URA-8A FSK convertor which feeds a tone into an RAPC undulator.
  - C. Feeding the IF output of a receiver into the RBR-13 receiver which feeds a 10 KC tone into a magnetic tape recorder.
4. Following are the results of these systems:
- A. In feeding an FS signal from a receiver directly into an RAPC undulator, it is necessary to eliminate the space tone by zero beating it with the BFO control on the receiver. This system was not too suitable

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due to the difficulty encountered in differentiating between mark and space in the tuning of the BFO control. This is due to the high speed of the transmission. Also there was no way of discriminating against interfering signals as retuning would cause the undulator to copy the space as well as the mark signals. This could then be corrected by retuning the BFO control. With these points in mind it is recommended that this system be avoided if possible.

- B. The receiver/convertor/undulator system was far superior to the previous system mentioned. It was found that the adjustments made on this equipment were critical but good results could be obtained with a relatively clean signal. 598 abbreviated numerical groups were copied by this system. As an average for each message, 67% of the groups were perfect. The average of character errors made in each message was 10%. The best message received had 84% of the groups perfect with 4.8% character error. The poorest message had 41% of the groups perfect with 16% character error. The percentages shown above may include some transmitted errors. See paragraph 5 for more details on this point.
- C. The receiver/RBR-13/magnetic tape recorder system proved to be a comparable system to the preceding one for clean signals. Care must be taken in the adjustment of this equipment but it is not critical once it is properly set up. 224 abbreviated numerical groups were copied by this system. The following chart shows the comparison between the preceding system and this system for the messages that were copied simultaneously by the two systems.

<u>RBR-13</u>	<u>RAPC</u>
Average - 76% groups perfect	Average - 64% groups perfect
Average - 8% character error	Average - 11% character error
Low - 48% groups perfect	Low - 48% groups perfect
High - 92% groups perfect	High - 76% groups perfect

The last two items on this chart indicate the messages that had the lowest and the highest perfect group counts for each system. It so happened that the lows for both systems occurred on the same message and the highs for both systems occurred on the same message.

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5. For three out of the four messages copied simultaneously by the RAPC and the RBR-13 systems, the RBR-13 gave superior message quality. The fourth message was very poor and was about of equal quality from both systems. It might be noted at this point that the tapes used to transmit the messages from the RS-13 were proof-read and any errors found were noted accordingly in the grading of the messages from the various receiving systems. However this does not preclude the possibility of transmitted errors being made. In a cursory examination of a few groups from each system, several errors were noted that showed up in both systems. This would seem to indicate them to be transmitted errors. No attempt was made to take these into account because the same relationship still held between each system.
6. It was reported by the field team that the RS-13 keyer unit operated quite favorably. The tape stuck in the keyer several times but the trouble was most likely caused by a bent tape spool rather than a faulty tape feed mechanism.
7. In summary it is concluded that this field test was very successful and that valuable information was obtained from it even though propagation factors were not favorable. Based on the conclusions drawn from this test and on the findings of the laboratory work, it is now felt that the RS-13 and that the RBR-13 are ready for operational use.

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